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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/045,137 | 10/23/2001 | Albert Z. H. Wang | NS-3868-1C US | 3416 |

7590 08/29/2002
Edward C. Kwok
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EXAMINER

HU, SHOUXIANG

| | |
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| ART UNIT | PAPER NUMBER |
|----------|--------------|

2811

DATE MAILED: 08/29/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/045,137

Applicant(s)

WANG ET AL. 

Examiner

Shouxiang Hu

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 1-3 and 5-10 are objected to because of the following informalities and/or defects:

The term of "said second conductor" recited in claim 1 (the third line from the bottom) should read as --said second semiconductor--.

In claims 2, 3 and 5-10, the term of "the ESD structure" should read as --the ESD protection structure--.

In claims 8 and 9, each of the terms of "terminal" should read as --said terminal--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 8-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 8-10 recite the subject matter(s) involving a coupling of terminal A—first current source—first resistor—terminal K and the coupling of terminal A—second resistor—second—terminal K, and/or the current sources each

include a pair of back-to-back Zener diodes. These subject matters are apparently associated with the embodiments of Figs. 12-14. However, these associated embodiments are not enabled by the disclosure, because the disclosure fails to describe: (1) how and by what means the current sources can be activated (see page 18, lines 23-30); (2) how a current source can be formed of a pair back-to-back Zener diodes (see page 19, lines 13-26), given the fact that a diode itself can only serve as a voltage source (see page 20, lines 1-2); and (3) how the base of the bipolar transistor (130 or 150, Fig. 3) can be directly connected to both of the current source (770 or 772) and the resistor (756 or 758), given the fact that the base region is a lightly doped region, which itself always has residual resistance when connected to the outside.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. ("Huang"; 4,947,226) in view of Kim (5,844,280).

Huang discloses a bi-directional switch structure (Figs. 4 and 5), comprising: A first semiconductor region (26, n+); a second semiconductor region (24, p); an electrically floating third semiconductor region (22, n); a fourth semiconductor region (25, p); and a fifth semiconductor region (27, n+); a first terminal A (33) is connected to

the first and the second semiconductor regions; and a second terminal K (34) is connected to the fourth and the fifth semiconductor regions.

Although Huang does not explicitly disclose that the bi-directional switch structure can be used in an ESD protection structure, one of ordinary skill in the art would readily recognize that such a bi-directional switch structure can be desirably used in an ESD protection structure for achieving bi-directional ESD protection, as evidenced in Kim (see Figs. 3 and 4).

It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to make the bi-direction switch structure of Huang and apply it to an ESD structure, as taught in Kim, so that the semiconductor device with bi-directional ESD protection would be obtained.

Regarding claim 3, the bi-directional switch structure of Huang has an npnp polarity, while the one in Kim has a pnpn polarity. And, one of ordinary skill in the art would readily recognize that semiconductor devices designed with one polarity using an npnp structure are also workable with the other polarity using a pnpn structure. It is therefore well within the ordinary skill in the art to reverse the polarity of a device with the npnp structure to form a device with the pnpn structure for obtaining the desired device polarity.

Regarding claims 5-7, the third region in Huang includes an n-well in a p-type semiconductor substrate.

6. Claims 8-10, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. ("Huang"; 4,947,226) in view of Kim (5,844,280), as applied to claims 1-3 and 5-7 above, and further in view of Jonassen (3,890,543).

The disclosures of Huang and Kim are discussed as applied to claims 1-3 and 5-7 above.

Huang and Kim do not disclose that two current sources each including a pair of back-to-back Zener diodes in series with a resistor are connected in parallel to the two terminals. However, Jonassen discloses a voltage surge protection structure (Fig. 4) having a pair of back-to-back Zener diodes (13 and 14) in series with resistors (20 and 20') in parallel to the two terminal of the protection structure (11).

It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate one or two pairs of Jonassen's back-to-back diodes in series with one or two resistors into the ESD protection structure collectively taught by Huang and Kim, so that its time response and voltage imbalance conditions can be improved, per Jonassen's teaching.

Response to Arguments

7. Applicant's arguments with respect to claims 1-3 and 5-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References D-G are cited as being related to a semiconductor switch structure.

9. Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 or 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ***Shouxiang Hu*** whose telephone number is **(703) 306-5729**. The examiner can normally be reached on Monday through Thursday from 7:30 AM to 6:00 PM.

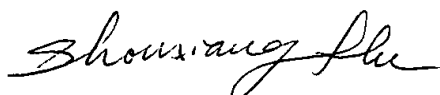
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ***Tom Thomas***, can be reached on **(703) 308-2772**. The appropriate fax phone number for the organization where this application or proceeding is assigned is **(703) 308-7724**.

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Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **(703) 308-0956**.

A handwritten signature in cursive script, appearing to read "Shouxiang Hu".

Shouxiang Hu
August 23, 2002